12.3.8

SEASPAN 194 CAPSIZE

In a recent inspection of the capsized barge Seaspan 194, now at Vancouver Shipyards, we have noticed a crack in the side shell. The crack is in way of the upper side shell "A" fender between FRS 7 and 8 on the starboard side. A very heavy impact is evident on the "A" guard and the upper edge of the guard between FRS 7 and 8 has punched in the side shell approximately 2 inches below the main deck. The horizontal crack appears to be about 2 feet long.

The finding of this hull crack fills in a lot of missing answers and now offers a logical explanation of the capsize.

The following series of events is a theory only, but in the writers opinion one with a high probability of being the actual events.

FIGURE 1

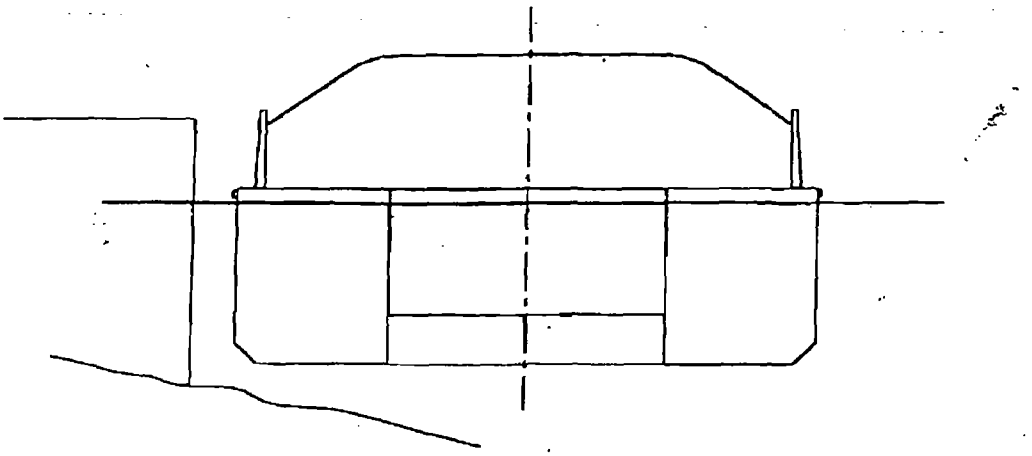

Figure 1 shows the barge as it arrived at the unloading dock. The mean freeboard was 14 $^{1}/_{2}$" as measured at the loading site. Freeboards at the unloading dock are not available. Corroded welds in the bottom plate in way of No. 1 centerline tanks has allowed water to enter this compartment over a long period. In effect, this compartment is tidal but air compression when the barge is loaded prevents the void filling to the loaded water line. When the barge capsized the water in this compartment was trapped. ~~We have measured this water depth~~ in the upside down condition so we know that 140 L. tons of water was on board at the time of capsize. This water was free to create a free surface effect and while not enough to capsize the barge in a free floating condition it did play a part in the course of events.

FIGURE 2

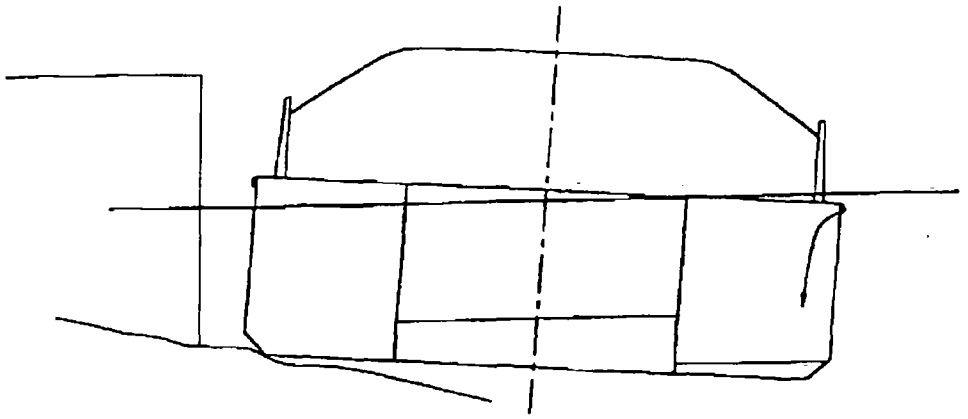

Figure 2 illustrates what happened during the first low tide. The barge grounded on the limerock berm lifting the port side and submerging the starboard deck edge. Sea water then flowed into No. 1 starboard void space continuously but at an unknown rate slowly filling the space. The free surface effect of water in No. 1 center space increased the list to starboard helping to submerge the deck edge.

FIGURE 3

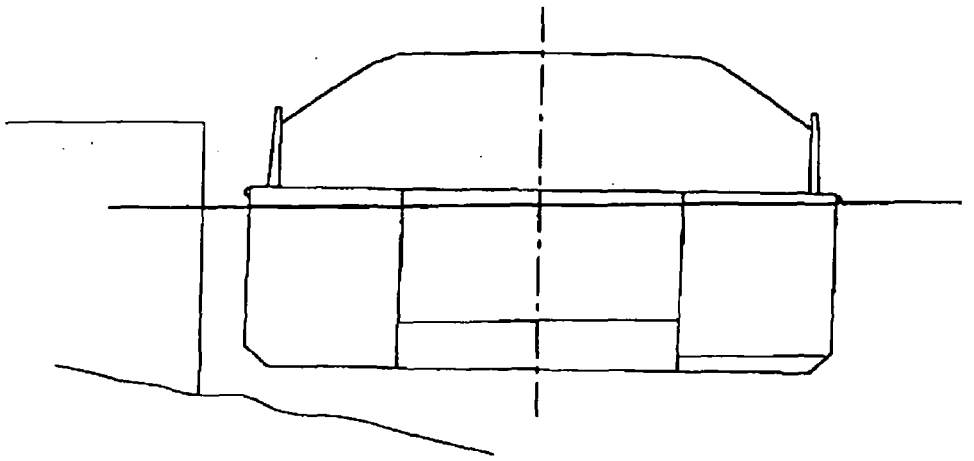

Figure 3 shows that when the tide came back in the barge port side lifted off the berm and the starboard side deck edge re-appeared above the water line. Water taken in to No. 1 starboard void space along with the free surface effect of water in No. 1 center tank ensured that the barge had a slight starboard list during the period of high water. The list would have been noticeable but not extreme.

FIGURE 4

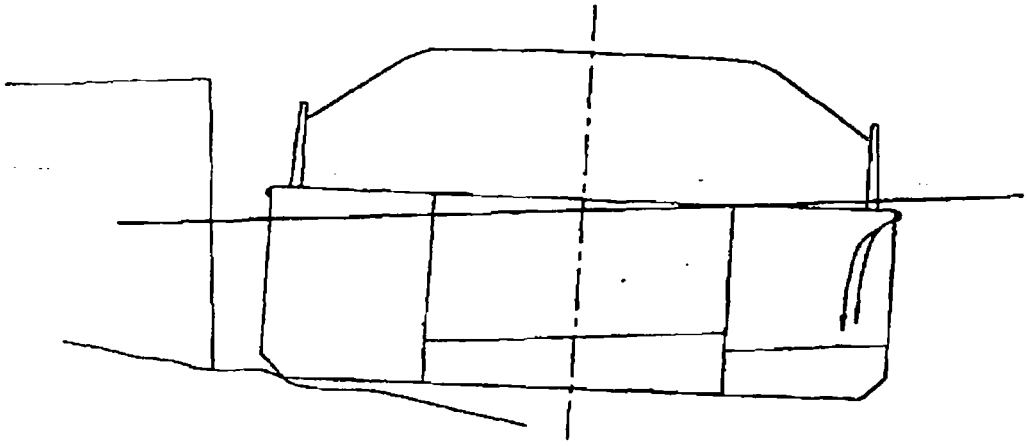

Figure 4 illustrates the return of low tide (2nd low tide). Again, the port side grounds on the berm lifting the port side and submerging the starboard deck edge. Water again flows into the No. 1 starboard void space increasing the list. As the list increases, again aided by the free surface effect of water in No. 1 center tank, hydrostatic head increases the water flow into the starboard tank.

FIGURE 5

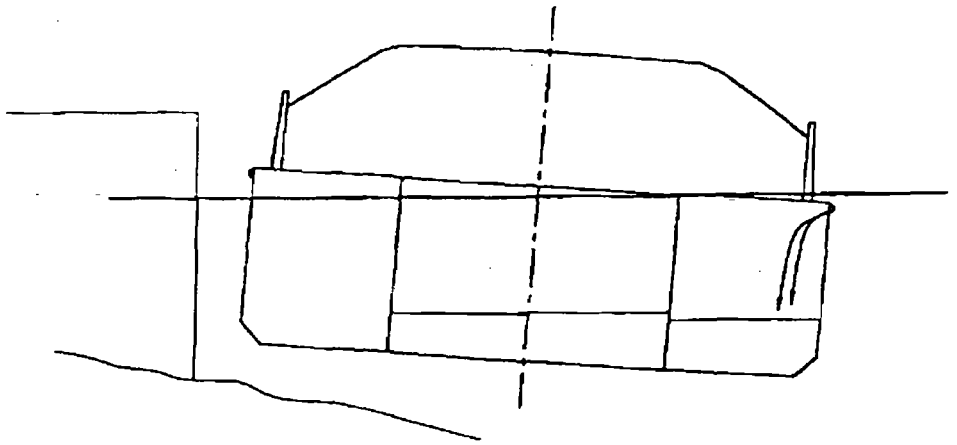

Figure 5 illustrates the return of high tide (2nd high tide). The port side floats free of the berm but there is enough water now in the No. 1 starboard void space (aided by free surface effect) to ensure that the starboard deck edge stays submerged. The void space continues to flood at an ever increasing rate as the list increases. The list would be at least 5° now and with the deck edge submerged the barge would be seen to be in danger by any observer.

FIGURE 6

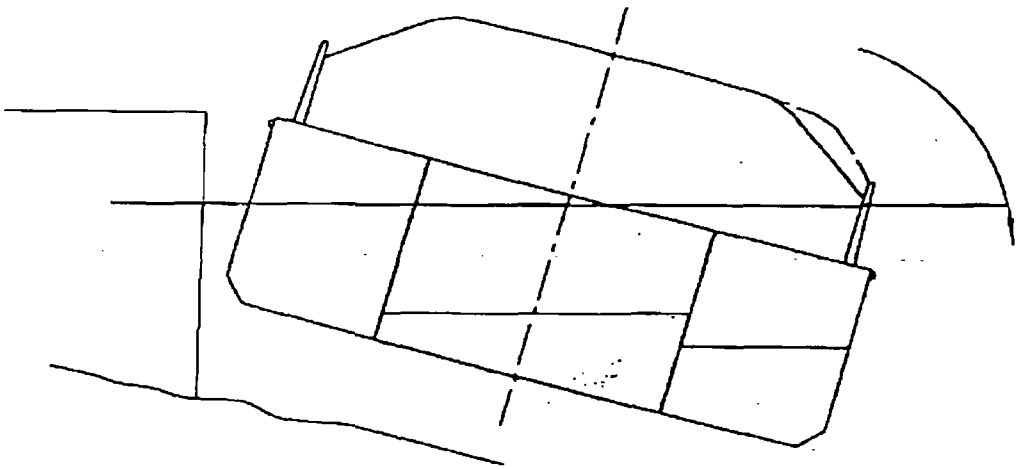

Figure 6 illustrates the final moments of the incident. The list increases to a point where either the barge loses stability due to lowering of the metacenter (lack of deck area) or the deck cargo shifts and moves to starboard. It must be remembered that the active free surface effect will exaggerate the effect of flooding in the starboard void spaces. The barge capsizes trapping the water in No. 1 centerline and blowing out the starboard box wall. The effect of the barge rotating and slamming down upside down moved the starboard box wall back inboard and the port box wall outboard. All this effect can be seen on the barge now in Vancouver Shipyards.

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